The Integration of Energy, Environment and Health Policies in China: A Review

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Abstract

The goal of sustainable development is far from being achieved in China. In this context, this paper aims to provide an overview of China's energy, environment and health policies over the past 30 years and discuss whether the previous policies have fully integrated the energy, environment and health issues in its sustainable development agenda. From the overview, we observe that the energy policies accelerating energy industrial upgrading, stimulating development of new energy sources, deregulating energy pricing mechanism, promoting energy saving and seizing the opportunity of green growth are conducive to an improvement of environmental conditions and public health in China. However, the environmental policies are not effectively implemented and subsequently they could not succeed in reducing environmental risks on public health and putting pressure on enterprises to efficiently use energy. The health policies have not taken real actions to focus with any specificity on energy-induced or pollution-induced health problems.

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1. Introduction

Following the outcome of the United Nations Conference on Environment and Development in Rio de Janeiro in 1992, China issued a document entitled “Ten Strategic Policies for Environment and Development” to release a national strategy of sustainable development the same year. This was a milestone in the beginning of sustainable development strategy in developing countries. In 1994, the State Council promulgated “China’s Agenda 21: White Paper on China’s Population, Environment, and Development in the 21st Century”, which specified policies and measures for realizing sustainable development (Yao et al., 2005; Zhang and Wen, 2008). In 2004, the Chinese government took a further step to establish the national sustainable development strategy through publishing the “Program of Action for Sustainable Development in China in the Early 21st Century”. In addition, the Chinese government has embedded the sustainable development strategy into the national Five-year Plan since the implementation of the Ninth Five-year Plan (Li and Oberheitmann, 2009).

Yet, the goal of sustainable development is far from being achieved in China as it still follows the development pattern, which allows maintaining economic growth at the expense of depleting non-renewable energy resources and harming the environment and human health. Since the start of open-door policies and economic reforms in the late of 1978, a substantial amount of primary energy has been consumed to fuel the remarkable economic growth. Nowadays, China has overtaken the United States as the world’s largest energy consumer. The ever-increasing energy consumption has imposed more and more severe pressure to domestic supply capacity. Since 1993, China has turned from a self-sufficient supplier to a net oil importer. Currently, about half of domestic oil consumption comes from imports (He et al., 2012; Zhang et al., 2011). Even in 2009, China became a net coal importer for the first time although the country was the world’s largest coal producer (Lin et al., 2012; Wu et al., 2005; Yalta and Cakar, 2012). The fossil-fuel dominance in the energy mix further places considerable pressure on the environment. Since 2006, China has become the largest carbon emitter in the world. Fossil-fuel combustion is also responsible for most other pollutants including particulates, sulfur dioxide and nitrogen oxides. The concentrations of these pollutants in many cities are often above the national standards and World Health Organization guidelines and therefore pose a

severe threat to health (Byrne and Shen, 1996; Cook and Dummer, 2004; Dummer and Cook, 2007).

In this context, this paper aims to provide an overview of China's energy, environment and health policies over the past 30 years and discuss whether the previous policies have fully integrated the energy, environment and health issues in its sustainable development agenda.

This paper is structured as follows. Section 2 is devoted to present historical evolution of policies in energy, environmental and health sectors. The integration of energy, environment and health policies is discussed in section 3. Section 4 offers conclusions.

2. Methods

2.1 China's energy policies

This section aims to present the historical evolution of policies relating to electricity, coal, oil-gas, new energy and energy saving.

2.1.1 Electricity policies

Electricity policies initiated by Chinese government lay equal emphasis on both reliable supply and conservative/reasonable demand to ease frequent power shortages, and the priority is given to the latter in recent years (see Table 1).

a) On the supply side

In response to the worsening power shortages during the early post-reform period, in 1985 China removed the central government's exclusive monopoly over investment in power sector and opened the generation market to non-state investment entities. In the following years, Chinese government introduced a set of pricing policies to stimulate capacity investments from diverse non-state generators. For example, in 1993, "new plant–new price" policy was implemented. This policy allowed the

generation tariffs provided by non-state generators and new plants built after 1992 to be set according to the rule of "repayment of principal and interest".

Policies are also designed to overcome the bottleneck problem of power distribution. The fragmented and lag behind transmission networks further constrained the improvement of unbalanced power distribution. "West-East Power Transmission project" was thus put forward in 2000.[2] This project planned to transfer the electricity produced in the resource-rich western regions to the demand-intense eastern regions.[3]

In line with the growing concerns about energy conservation and environmental protection, a number of policies were released to accelerate the structure upgrading of electricity industry towards large-scale and efficient generation units. For example, "Guidance in Shutting Down Small Thermal Power Units" was published in 1999, which marked the start of the work to phase out the small inefficient generation units.

b) On the demand side

To alleviate stress on the installed capacity, Chinese government undertakes pricing policies to reduce electricity demand in both industry and residential sectors. In 2004, "Differential Electricity Pricing Policy" (DEPP) for industrial enterprises was launched. This policy allowed different electricity prices for industrial enterprises to be set based on their energy intensity level.[4] However, local governments deviated from the implementation of this policy by instituting their own preferential electricity pricing policies (PEPP) to energy-consuming industries as they believed that the DEPP would negatively affect local economic growth (Li et al., 2011). To overcome this difficulty, the central government announced "Notice on Further Implementing Related Issues of the Differential Electricity Pricing Policy" in 2007 to change the

[2] The distribution of electric power is uneven in China. The western areas are rich in electricity resources while the eastern areas with high level of economic development lack electricity resources and therefore often suffer from power shortages.

[3] In this project, the western regions cover Guizhou, Yunnan, Guangxi, Sichuan, Inner Mongolia, Shaanxi and Shanxi, and the eastern regions include Guangdong, Shanghai, Jiangsu, Zhejiang, Beijing and Tianjin.

[4] Under this policy, enterprises, which were in six energy-intensive industries including electrolytic aluminum, ferroalloy, calcium carbide, caustic soda, cement and steel, were grouped into four categories: encouraged, permitted, restricted, and eliminated. Enterprises in the encouraged and permitted categories were required to pay the normal electricity price, while enterprises in the restricted and eliminated categories were ordered to pay surcharges in addition to the basic electricity price (Price et al., 2010).

allocation of the revenues collected from the implementation of DEPP (Chen, 2011).[5] This change provided strong incentives for local authorities to implement the DEPP (Price et al., 2010). In 2011, "Guiding Opinions on the Pilot Implementation of Tiered Pricing for Household Electricity" was launched to promote Tiered electricity price (TEP) reform in household sector.[6] In 2012, residential users began to switch to the TEP that was designed with three tiers.

2.1.2 Coal policies

Coal policies have made great efforts to restructure coal industry and promote market-oriented coal pricing mechanism (see Table 2).

a) Industrial structure reform

Coal industry under tight government control could not meet rapidly increasing coal demand and therefore resulted in national wide coal shortages in the early 1980s. Under this situation, the central government relaxed market access to stimulate coal supply. For example, in 1982 "Principle of state-owned, collectives and individuals all work together to develop large, medium, and small mines" was introduced. Later in 1983, "Report on Eight Measures in Developing Small Coal Mines" was issued. These policies signaled the starting of "two-leg walking" strategy, which encouraged the development of both large scale State-owned Coalmines and small scale local coalmines.[7] Since then, the small coalmines underwent a high-speed development stage and contributed to satisfy the roaring coal demand. However, the flourish of small coalmines also brought serious environmental problems. Also, the boom of small mines made coal industry suffer from an oversupply coal market. Thus, the government issued programs in 1994 to slow the coal production of small mines. Unfortunately, these programs did not succeed in slowing the rapid development of small coalmines which competed with the State-owned Coalmines for resources and

[5] Since then, the revenues were no longer turned over to the Ministry of Finance (MOF) but to the Departments of Finance at provincial level and the revenues were allowed to be used to support local economic construction as well as energy conservation and emission reduction programs (Chen, 2011).
[6] The TEP provides several price tiers and will charge an additional payment if electricity consumption exceeds the upper bound of each tier (Wang et al., 2012).
[7] Small scale local coalmines include Local State Coalmines and Township and Village Coalmines.

market share.[8] In 1998, the government issued policy to call for closing small, inefficient and illegal coalmines and reducing coal production. Afterwards, the reform efforts were put into building large coal bases and large coal groups.[9] For example, "Opinions on Promoting the Healthy Development of the Coal Industry", issued in 2005, formally stated the idea of building large coal bases and large coal groups. Noteworthy, an ongoing strategy is to build large-scale thermal power stations near the large coal bases so as to create large coal-electricity bases. The main advantages of this strategy are twofold. First, they could solve the rail bottleneck for transporting coal to power plants over long distance. Second, they could overcome conflicts between power generators and coal suppliers by providing secured coal supply to power generators.

b) Market-oriented pricing reform

In 1983, "Notice on the Price Increase of Coal Overcapacity in Part of Coal Mines, Trial" introduced the scheme of "Two-tier pricing" to replace the tightly government-controlled coal pricing system. Under the "Two-tier pricing" scheme, output in-quota was sold at planned price regulated by the central government, while the output above-quota could be sold at 50% above the planned price, or at a floating market price starting in 1984 (Yang et al., 2012).[10] Hereafter, this scheme did contribute to an expansion of coal production. Under this situation, the central government decided to further deregulate the coal prices except for CE in 1993.[11] Since then, the prices of non-electricity-related coal were market-driven, while the price of coal in-plan for electricity generation was still controlled by the central government (Wu, 2003). In 2012, "Guiding Opinions on deepening the reform of thermal coal market" indicated that the price intervention for CE under "Important Contracts" will be cancelled and the double-track coal pricing scheme will be

[8] Although the central government called for reducing the output of local coalmines so as to give more market share to the State-owned Coalmines, the local governments had incentive to support the development of local coalmines as the latter could contribute to local economic growth.

[9] These reform efforts are in purpose of reinforcing the central government's control over coal sector and help the central government to coordinate coal and industrial policies much more easily.

[10] Private mines were given an output quota by applying contracting responsibility system. The MOF contracted with the MOC, which in turn contracted with the provinces, prefectures, departments and bureau, and through these bodies with the private mines. They could sell their output in-quota at a fixed price to the state and sell their output above-quota at 50% or 70% or a market price (Thomson, 1996).

[11] The prices of coal used for electricity generation is called "coal to electricity (CE).

abolished in 2013. It marked that coal pricing reform will again further move towards market-oriented mechanism.

2.1.3 Oil - gas policies

Oil-gas policies have tried to respond to the challenges of supply security and market-based pricing mechanism (see Table 3).

To ensure the stable supplies of oil and gas, the central government began to build oil reserves and construct liquid natural gas (LNG) terminals and natural-gas related infrastructures. For example, until 2001, the central government officially declared "Government-administered strategic oil reserve program" in order to be away from the potential oil supply disruptions.[12] To help gas importers, the central government has made greater efforts to improve the natural gas distribution network and construct LNG receiving terminals. Over the last decade, a number of projects on constructing natural gas pipelines and LNG import terminals have been completed or launched. The long-distance natural gas pipeline projects were designed to connect inter-provincial gas pipelines so as to allocate gas to areas that needed it, such as, the West–East Gas Pipeline project and the Shaanxi-Beijing Gas Pipeline Project, and to link to neighboring economies in order to boost imports from the neighbors, for example, the Central Asia-China Gas pipeline project and the China-Russia Gas Pipeline Project. The LNG terminal projects were planned to open more windows for receiving imported LNG from multi-channels, such as, the Guangdong LNG Terminal project and the Zhuhai LNG Terminal project.

The increasing import dependency placed pressure on reforming China's oil and gas pricing mechanisms. The policy of "100 Million tones crude oil production contract", which allowed oil enterprises selling their above-quota output beyond 100 Million tones at a higher market price pegged to world market prices, marked that the "two-tiered pricing system" was created to replace the tightly government-regulated

[12] This program was planned to take 15 years to complete in three phases with a reserve capacity of 12, 28 and 28 million tons, respectively. The state-owned oil companies including SINOPEC, CNPC and CNOOC are responsible for the construction of the facilities for oil reserves. Oil Reserve Office of the NDRC is responsible for oil reserve affairs. Later in 2007, the new established Oil Reserve centre under NDRC took the responsibility of managing and operating oil reserve. The first four sites of this program, located in coastal areas, were put in construction in 2004. The second phase of this program, concentrated in hinterland areas, was started in 2009. The choice of locations for the third phase of this program is under discussion.

pricing system. In 1998, “Crude Oil and petroleum Products Prices Reform plan” further allowed the prices of domestic oil and refined oil products to move in line with the international market prices. However, the oil prices after the reform efforts merely delivered the message on the changes of world market in form of price signal to the domestic market and failed to reflect the real supply-demand relations and subsequently cannot play a satisfactory role in energy resource allocation (Hang and Tu, 2007). Thus, in 2005 “Notice on Reforming the Formation Mechanism of Natural Gas Ex-factory Price and Appropriately Raising Natural Gas Ex-factory Price in the Near Term”, which allowed the ex-factory price to reflect supply and demand of natural gas, to link with the prices of alternative energy and to be increased appropriately, was instituted.

2.1.4 New energy policies

The government has long been aware of the advantages of new energy and has given a set of policy supports for their development. The policy supports have given priorities in stimulating the development of biogas, wind, solar, biomass, hydro and nuclear energy (see Table 4).

In 2000s, a series of policies were promulgated to promote the construction of biogas digesters in rural areas. For example, the programs of “Regulations on Rural Biogas Projects Supported by National Bond” and “National Debt Project for Rural Biogas Construction” were carried out in 2003 in order to provide infrastructural service and financial subsidy for the construction of biogas digesters in rural households. In 2007 “Development Scheme for Service System of Rural Biogas in China” planned to build a biogas service network to provide monitoring facilities, maintenance tools and biogas accessories.

Wind power entered into a stage of rapid industrialization in the early 1990s. Since then, a set of policies have been carried out to attract investment in wind power industry, to integrate wind power into the national grid and to set pricing mechanism of wind power. For example, in 1996, “Ride the Wind Program”, which aimed to establish a high-quality domestic wind turbine manufacture industry, was issued. In 2003, “Wind Power Concession Project” was implemented to establish large scale wind farms. The introduction of this Project marked a milestone of Chinese success in

the development of wind power.

Other new potential energy resources, including solar, hydropower, biomass and nuclear energy, also attract increasing attention of Chinese government. Their development also highly depends on policy supports. For example, “Brightness Program” was put forward in 1996 in order to provide capital to assist utilizing renewable technologies like solar PV (photovoltaic) to generate electricity in remote areas (Yao et al., 2012). To promote and extend crop stalk gasification techniques in rural areas, “Crop Stalk Gasification Project” was launched. To further meet the power needs in non-electrified townships, in 2002 “Township Electrification Program” was initiated to promote construction of solar PV power and small-scale hydropower stations. This is the largest renewable energy-based rural electrification program in terms of investment volume ever carried out by the country (Shyu, 2012).

2.1.5 Energy saving policies

Energy saving, as a new strategic direction of energy sector, has recently become a top priority in the Chinese government’s policy agenda (Andrews-Speed, 2009; Yang, 2008) (see Table 5).

The government has placed considerable emphasis on the energy savings of industry sector. For this purpose, the government has put great efforts on adjusting industrial structure. For example, “Temporary Regulation on Promoting Industrial Structure Adjustment” and “Notification on Promoting Structure Adjustment of Industries with Surplus Energy Production” were released in 2005 and 2006. “Guidance to expedite structural adjustment of aluminum, coal, cement, calcium carbide, coke, ferroalloy and textile industries” was also issued in 2006. Equal attention gives to stimulating energy efficiency. For example, in 2006 “Top-1000 Enterprises Energy-Saving Program” was launched to improve energy efficiency in the energy-consuming industrial enterprises.[13] This program aimed at reaching the overall saving target of 100 million tons of coal equivalent and thus it was one of the key initiatives for realizing 20% reduction of energy intensity during the 11th

[13] In this program, 1000 large-scale enterprises, which covered nine energy-consuming sectors (iron and steel, petroleum and petrochemicals, chemicals, electric power generation, non-ferrous metals, coal mining, construction materials, textiles, and pulp and paper) and accounted for about 50% of industrial energy demand, were designated to sign responsibility contracts with the government for achieving their own energy saving targets.

Five-Year period (Andrews-Speed, 2009; Ke et al., 2012). In 2011 the revised version of "Implementing Rules for the Resource Tax Interim Regulations" was promulgated, which required the enterprises extracting mineral products within the territory of China to pay resource tax.[14]

The government also attaches importance to a range of potential energy-savings sectors. For example, in 2006 "Guidelines for Implementation of Ten Key Energy-saving Projects" was announced in order to save 240 million tons of standard coal equivalent (Hou et al., 2011).[15] To address the high energy consumption in transport sector, in 2009 "Notice on New Energy Vehicle Demonstration and Extension Work" was published to provide subsidies for the public sector's purchases of new energy vehicle in the 13 cities selected.[16]

2.2 China's environmental policies

This section presents the historical evolution of policies directing at reducing air and water pollution and enhancing environmental management capacity.

2.2.1 Air quality management

Until nowadays, China's efforts in protecting the environment have primarily concentrated on reduction of air pollution, the focus of which has tended to shift from end-of-pipe control towards prevention by introducing various command-and-control, market-based and information-based instruments (MacBean, 2007; Managi and Kaneko, 2009; Zhang and Wen, 2008).

Air pollution control at end-of-pipe was formally supported when the Environmental Protection Law was promulgated by the State Council in 1989 (see

[14] In the regulation, a tax system on fossil resources including crude oil, natural gas and coal was stated. Under the new implementing rules for resource tax, the resource taxes for crude oil and natural gas are levied based on the actual sales value, while the resource taxes for other natural resources are still levied based on the production volume.

[15] The 10 key projects focused on coal-fired industrial boiler (kiln) retrofits, district cogeneration projects, waste heat and pressure utilization projects, petroleum conservation and substitution projects, motors energy efficiency projects, energy system optimization projects, building energy conservation projects, green lighting projects, government agency energy conservation projects, and energy saving monitoring and testing and technology service system building projects (Hou et al., 2011; Ke et al., 2012).

[16] It included Beijing, Shanghai, Chongqing, Changchun, Dalian, Hangzhou, Jinan, Wuhan, Shenzhen, Hefei, Changsha, Kunming, and Nanchang.

Table 6). This law marked the start of China's environmental legal framework (Tsang and Kolk, 2010).[17] In 1996, "Plan on Total Emission Control of Major Pollutants during the Ninth Five-Year Period" was released , which signalled the starting of total emission control over 12 major pollutants (e.g., smoke dust, sulphur dioxide) (Zhang et al., 2007; Zhang and Wen, 2008).[18] In 1998, the policy of "Plotting Program of Acid Rain and SO_2 Control Zones" allowed taking more stringent actions to control SO_2 emissions.[19]

Lately, the Chinese government has shown increasing interests in controlling carbon emissions. In the late of 2009, the Ministry of Finance issued a report that suggested imposing a carbon tax in 2012-2013. In the same year, "Measures for management of Voluntary Emission Reductions Transactions in China" was introduced to show the ongoing efforts of the government in developing carbon trading markets. To further improve the function of carbon market, "Guidelines for compilation of provincial GHG inventories" was released in 2011, which helped to calculate local GHG inventories. In the same year, "Notice on Carrying out the Work of Pilot Carbon Emission Trading" was also promulgated to allow piloting carbon trading markets in 5 cities (Beijing, Tianjin, Shanghai, Chongqing and Shenzhen) and 2 provinces (Guangdong and Hubei) (Wang, 2012).

2.2.2 Water pollution abatement

In face of increasing serious pollution of water bodies, the government did not take policy action until the 1980s. To address industrial water pollution, in 1984 the National People's Congress passed "Water Pollution Prevention and Control Law", which was amended in 1996 and 2008. Compared with the 1984 version, the 1996 amendments instituted a system for controlling of the total discharge of major water pollutants. The 2008 revisions specified stricter penalties for violators and established a water pollutant discharge permit system. Meanwhile, in 1988 "Interim Measures on

[17] Environmental quality/discharge standard, discharge permit system and three synchronisations system, as instruments of controlling pollution, were introduced in the law.

[18] Under this policy, the enterprises were required to pay for their pollution emission exceeding the relevant national or local pollution standard but at a levy rate lower than the pollution control cost (He, 2005).

[19] Acid rain and SO_2 control zones include the cities and provinces suffering most from acid rain and SO_2 pollution (He, 2005).

Management of Water Pollutant Discharge Permits" was promulgated to grant authority for the discharge license system to local competent departments of environmental protection administration. In 1996 "Integrated Wastewater Discharge Standard" stated the upper limit for major pollutant concentrations and the total allowed water discharge for some industries.

2.2.3 Environmental management initiatives

To cope with the challenge of implementation gap, the initiatives of environmental management, which manifest a shift towards decentralisation and public participation, have been a key part of environmental policies.

To enforce the implementation of environmental policies at local level, in 1996 "Decision on Several Issues Concerning Environmental Protection" was promulgated, which required all levels of government to adopt an environmental protection target responsibility system. Under this system, the entire local governments were involved in the goal of environmental protection (Tang et al., 2010). In addition, local leaders have to incorporate the environmental concerns into the planning of local economic development as their promotion were linked to the achievement of environmental protection targets (Liu et al., 2012).

In response of increasing public concerns over the environmental problems, in 2006 "Interim Measures on Public Participation in Environmental Impact Assessment" was released to provide specific arrangements and procedures to encourage direct involvement from the public in the Environmental Impact Assessment. This policy represented a significant step to make the government's environmental decision-making more transparent and democratic. Later in 2007, "Regulations on Governmental Information Disclosure" and "Trial Guidelines for Environmental Information Disclosure" were issued. These policies aimed at helping the public to participate in the environmental governance as the public participation was believed to put a pressure on the local governments to effectively implement the environmental laws and regulations (Liu et al., 2012).

2.3 China's health policies

This section presents some important policies relating to the reforms of health insurance and health care (see Table 7).

2.3.1 Health insurance reform

To correct perceived dysfunction in the health sector, the policymakers have made great efforts in establishing a social medical insurance system with a target goal of ultimately achieving universal insurance coverage by about 2010 (Wang, 2009). For example, in 2002 the New Cooperative Medical Scheme (NCMS) was introduced to prevent rural residents from being impoverished by heavy medical expenses (Dong, 2009; Yip and Hsiao, 2009). In 2007 “Guiding Opinions on the Pilot Urban Resident Basic Medical Insurance” was released, in which the BHIS for urban residents was initiated to cover the urban residents who were not insured in the BHIS for urban employees (including children, the elderly, the disabled, students and other non-working urban residents) (Lin et al., 2009; Tang et al., 2012; Wagstaff et al., 2009; Yip and Hsiao, 2009).

2.3.2 Health care reform

Over the past years, the policymakers have also tried hard to tackle the cost escalation of healthcare with an ambitious target of realizing universal health coverage by 2020 (Tang et al., 2012).

a) Primary health care service

The government funding has been continuing to be directed towards establishing a primary care delivery system, which anchors on community health services in urban areas and township health services in rural areas (Yip and Hsiao, 2009). The urban and rural primary healthcare systems remain being reformed separately (Bhattacharyya et al., 2011).

b) National Essential Medicines Scheme

In recent years, the government has also made a commitment to significantly reform pharmaceutical sector in China. In particular, in 2009 the central government introduced a more successful national essential medicines scheme (NEMS) compared with previous schemes.[20] The NEMS was initiated to address the problem of irrational use of expensive medicines in health institutions and therefore aimed at cutting the profit link among health institutions, doctors and medicines and improving access to affordable medicines (Tian et al., 2012; Wang and Zhang, 2011). The essential drug list was later further updated in 2012.

c) Public hospital reform

Another promising movement in health care sector is the ultimate start of public hospital reform after a long discussion. In 2010, "Guidelines on Pilot Public Hospital Reforms" declared the first wave of pilot projects on reforming government-owned hospitals. Under this policy, 16 representative cities were selected by the central government to implement the pilot reform. Generally speaking, these pilot reform projects aimed at cooperating public hospitals with other primary health care facilities, separating the operation and supervision of public hospitals and quitting the financing mechanism of heavy reliance on medical service charges.

3. Results and discussion

This section discusses whether the previous policies have addressed the overlaps of energy, environment and health dilemmas.

3.1 Energy policies

3.1.1 Conventional energy production

To fulfil the goal of sustainable energy development, the central government has

[20] The World Health Organization defines essential medicines as those that satisfy the priority health care needs of the population. The essential medicines are selected with regard to public health relevance, evidence on efficacy and safety, and comparative cost-effectiveness.

made significant efforts in promoting the market-oriented reform in power and coal industries. In the 1980s, the development of power and coal industries gave full focus on meeting the roaring energy demand while neglected the serious environmental pollution brought by the boom of small-scale thermal generation units and coalmines. Since the late 1990s, the central government has begun to concern about the environmental problems and has released a series of policies to accelerate the industrial upgrading by building large-scale thermal power plants (stations) and coal bases (groups).

3.1.2 New energy development

Meanwhile, the central government has given a set of policy supports for stimulating the development of new energy sources in purpose of mitigating the heavy dependency on fossil fuels. This policy priority has been considered as one of the key strategies for cutting back China's carbon emissions. Although establishing a new energy-dominant energy mix could help China to participate in the actions of fighting against global climate change, we should not loss sights of the other environmental problems arising from the production of these energy sources. For example, the manufacturing of solar cells may generate contamination from waste water and heavy metal waste. We also should not overlook the potential threat posed by the biofuel development to the environment and health.[21] The large-scale cultivation of energy crops may cause other ecological environment problems, such as soil erosion. The grain-based biofuel expansion may further accelerate the increase of food prices and intensify the concerns about food security (Chang et al., 2012). In addition, the unsatisfactory effects of the program implementations in rural areas show the difficulty in realizing the policies' desired objective. For example, the largest renewable energy-based rural electrification program carried out in 2002 failed to achieve the goal of easing rural households' dependence on traditional energy sources due to the unaffordable electricity tariff, insufficient electricity supply and poor electricity service (Shyu, 2012; Zhang and Kumar, 2011). The biogas construction programs also failed to motive rural households to abandon the uses of traditional biomass and coal (Gosens et al., 2013). Even the household biogas was closed soon

[21] Promoting the development of biofuels has been highlighted in the Medium and long-term Plan for Renewable Energy Development.

after the construction because of diverse reasons.

3.1.3 Pricing mechanism

In line with the ongoing market reform, Chinese government has gradually deregulated the pricing mechanism for the conventional energy (i.e. electricity, coal, oil and gas) sectors. The pricing mechanism of these sectors has evolved from tightly government-controlled, two-tier towards market-based system over the past two decades. In the 2000s, the successive policy efforts have considerably advanced the market-based pricing reform. Nowadays, the coal prices have been nearly fully determined by the market mechanism. The prices of domestic oil and refined oil products have been drastically increased and they have been allowed to be adjusted by referring to the world prices. Some electricity subsidies provided to the energy-intensive industries and residential sector have also been removed, although the deregulation reforms for power sector have lagged behind those for coal and oil-gas sectors. All these market-based reform efforts could help the energy prices to reflect production costs and resource scarcity and thus serve as a significant signal for motivating energy consumers to use energy efficiently, which contributes to mitigate the negative externalities on the environment and public health. To further rationalize the prices of crude oil, natural gas and coal, the central government has also deepened the resource tax reform in recent years. However, the rather low tax rate prevents the reform reaching the goals of energy conservation and environmental protection (Zhang et al., 2013b).

In contrast, the pricing for renewable energy power has introduced any market mechanism but has been strictly decided by the central government. To provide incentives for investments in renewable energy power, the prices of electricity generated from renewable energy are allowed to be much higher than the prices of that generated from coal-fired plants. However, the higher prices cannot reflect the more efficient production costs and fail to encourage the grids companies to purchase the renewable power, which further results in the under-deployment of renewable power. Therefore, the renewable power prices are still far from playing a satisfactory role in producing the co-benefits of reducing greenhouse gas emissions and improving public health.

3.1.4 Energy-saving projects

In recent years, energy saving has been increasing recognized as an essential strategy for achieving China's sustainable energy development. This strategy has been a top priority in both central and local governments' policy agenda since the 20% energy intensity reduction target was announced. To realize the ambitious target, the central government has initiated the energy-saving programs, such as Top-1000 enterprise program and Ten key program, which called for the governments, the energy-intensive industries and the public to work together for reducing energy consumption. These aggressive efforts have significantly contributed to the improvement of energy efficiency, which is conductive for reducing greenhouse gas emissions and health damage from pollution.

3.1.5 Green growth

Confronting the dilemmas of short-term economic growth and long-term sustainable development, the Chinese policy makers have taken a monumental decision to seize the opportunity of green growth by combining the goal of energy saving with the task of restructuring and upgrading industry. Green growth has been considered strategically important for tackling the intertwined challenges of energy depletion, environmental degradation and public health concerns in long term. To strive for green growth, the national government has held the lead responsibility in guiding the resource allocation by promoting the entire industry to shift in a green development direction. On the one hand, the central government has implemented a range of measures (e.g., reduction of export-tax rebate) to constrain the high energy-consuming production activities. On the other hand, the central government has involved itself in promoting the development of renewable energy industry (e.g., wind industry) and green industry (e.g., new energy vehicle industry) via an array of mechanisms in order to take a global leadership in these fields. The central government has provided a huge investment to support innovation of green technologies, has accelerated the transfer of innovation into production in state-owned enterprises, has introduced subsidy programs to create a market for new energy

vehicles and has helped the state-owned enterprises in renewable energy industry to achieve their international competitiveness.

3.2 Environmental policies

3.2.1 Control

To abate air and water pollution, the end-of-pipe control instruments are formerly dominant. A set of tools, such as emissions charges, have been applied to control the quantities and concentrations of pollutants in the 1990s. However, several problems limit the effectiveness of these policies in achieving the pollution reduction goals. For example, the inappropriate penalties for violators, which are significantly lower than the cost of pollution reduction, lead to a widespread non-compliance with environmental requirements. Another example is that the financial subordination of the local MEP to local governments forces the local MEP to become the agents of local governments and neglect their duties of implementing and enforcing the environmental policies. The ineffectiveness of these environmental policy instruments further fail to reduce the environmental risks on the public health and put the pressure on enterprises to use energy efficiently. In contrast, the policy effort in 2007 to control SO_2 emissions from the thermal power units might produce the desired environmental outcome, which might further bring about the expected energy and health benefices. Different from previous incentive policy, the price premium for power plants offered in this policy was not only based on the installation of the desulfurization equipment but also based on the operation and performance of the desulfurization equipment.[22] This, therefore, created an incentive for power plants to dramatically increase the number and performance of the desulfurization equipment (Schreifels et al., 2012).

Lately, the voluntary carbon emission trading schemes have been introduced in the national agenda and have been piloted in the appointed regions. However, the carbon trading initiative is primarily motivated by the economic benefices rather than the

[22] The price premium for electricity generated in power plants with desulfurization equipment provided in the 2003's incentive program was based on the installation of the desulfurization equipment but not on its operation and performance. This motivated the power plants to install poor-quality desulfurization equipment but not to operate it in order to obtain the price premium (Schreifels et al., 2012).

environmental targets (Lo, 2013). In addition, the success of this policy may be further challenged by the immature market economies (Lo, 2013). Therefore, the perspective on whether or not this policy can deliver the environment, energy and health benefices is still uncertain.

3.2.2 Prevention

To promote pro-active pollution prevention activities, the idea of Cleaner Production (CP) has been embodied in the environmental policies. The CP is considered as a strategy for reducing the environmental pollution and promoting efficient use of energy resources throughout the industrial production processes and thus is expected to play a prominent role in improving the public health. Nevertheless, the implementation of CP in the enterprises is far from satisfactory as many obstacles have been encountered in the introduction, development and application of CP (Zhang et al., 2013a). For instance, the prices of energy resources and the cost of pollution abatement are too low to act as a strong incentive for pollution prevention (Hicks and Dietmar, 2007). In addition, the demand of domestic consumers for green products is still in its early stages, which fails to place a sufficient pressure on the enterprises to improve the environmental performance of their products.

3.2.3 Environmental management

To tackle out the implementation failures of the environmental policies at the local level, modern environmental management including decentralization and public participation have been put on the government agenda. These modern management styles could force the local governments to put the environmental concerns into their policy agenda and empower the public to participate in the supervision of the implementation of environmental regulations, which therefore do help with the effectiveness of various policy instruments. The strict implementation of environmental policies may in turn provide a significant incentive for the enterprises to consider environmental protection and further take actions to control or prevent pollution. This is indeed conducive to the improvement of public health.

3.3 Health policy

The government's response to the emerging challenge of environmental health is falling largely behind the deteriorating environmental health conditions. Over the past decade the central government has enacted a range of regulations to establish the social medical insurance system and primary care delivery system and tackle the escalation of healthcare cost in purpose of improving the efficiency and equity within the health system. Nevertheless, these policies do not yet appear to focus with any specificity on the energy-induced or pollution-induced health problems. Even with the improved health facilities, the latent health effects of cumulative previous exposure may create new challenges for the healthcare provision. Only when the National Action Plan for Environment and Health was jointly released by 18 ministries in 2007, the concerns on the energy and environment risks was planned to be put on the health policy agenda. This action plan identifies coordinated and shared data collection and environmental monitoring as a crucial feature of future environmental health policies (Zhang et al., 2010). However, this plan does not emphasis the need to implement air pollution monitoring systems in rural areas. In addition, translating the plan into real action is still challenged by the effectively coordinate activities across many ministries.

4. Conclusions

In purpose of coping with the intertwined challenges of energy depletion, environmental degradation and public health concerns in response to sustainable development, this paper provide an overview of China's energy, environment and health policies over the past 30 years and discuss whether the previous policies have addressed the overlaps of energy, environment and health dilemmas.

From the overview, we observe that to achieve sustainable energy development the central government has made significant efforts to accelerate the energy industrial upgrading since the late 1990s. These reform efforts reflect that the central government has begun to concern about the negative externalities of energy production on the environment and public health. Meanwhile, the central government has given a set of policy supports to stimulate the development of new energy sources.

However, it is doubtful that the use of these new energy sources can bring about the co-benefits of improving the environmental quality and public health. Chinese government has also gradually deregulated the pricing mechanism in electricity, coal, oil and gas sectors. These policy efforts that help the energy prices serve as a significant signal for motivating energy consumers to use energy efficiently could further mitigate the negative externalities on the environment and public health. The strategy of energy saving is also conductive for reducing greenhouse gas emissions and health damage from pollution. In particular, the central government has decided to seize the opportunity of green growth to tackle the intertwined challenges of energy depletion, environmental degradation and public health concerns in long term.

To protect the environment, the central government has adopted a range of instruments to control or prevent air and water pollution. However, these policy instruments have not been effectively implemented and subsequently they have not succeeded in reducing the environmental risks on the public health and in putting the pressure on the enterprises to efficiently use energy. In contrast, the modern environmental management including decentralization and public participation may tackle out the implementation failures of the environmental policies at the local level and therefore deliver the environment, energy and health benefices.

To improve the public health, the central government has been engaged in reforming health insurance and health care systems over the past decade. However, its response to the emerging challenge of environmental health has been falling largely behind the deteriorating environmental health conditions. The health policies have not been taking real actions to focus with any specificity on the energy-induced or pollution-induced health problems.

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Table 1 Historical evolutions of policies in power sector

Year	Energy policies	Responsible agency
1985	Interim Provisions on Promoting Fund-Raising for Electricity Investment and Implementing Multiple Electricity Prices	SEC, SPC, MWREP, SPB
1987	Two-cent policy	SPC, MWREP, SPB
1993	Fuel and Transportation Add-ups	SPC
1993	New plant–new price	SPC
1997	Operation-period prices and yardstick prices	SPC
1999	Guidance in Shutting Down Small Thermal Power Units	SETC
2000	West-East Power Transmission project	SPC
2001	Notice on Regulating Administration of Electricity Prices	SPC
2003	Same-grid same-price	SPC, SETC
2004	Benchmark on-grid electricity tariff	NDRC
2004	Notice on Constructing the Mechanism of Coal and Electricity Prices Co-move	NDRC
2004	Differential Electricity Pricing Policy	NDRC
2005	Temporary Measures on Regulation of On-Grid Tariffs	NDRC

2006	Notice of Inspecting on Closing Down Small Thermal Power Units	NDRC
2007	Guideline for Building Large Ones and Shutting down Small Ones	NDRC
2007	Reducing the Wholesale Price of Small Thermal Power Units to Promote Shutdown	NDRC
2007	Reducing the Wholesale Price of Systematical Scheduled Small Thermal Power Units in Jilin, Hubei, and some of Other Provinces	NDRC
2007	Means for Energy-saving Power Generation Dispatching	NDRC, SERC, SEO, SEPA
2007	Notice on Further Implementing Related Issues of the Differential Electricity Pricing Policy	NDRC
2010	Notice on Clearing up the Preferential Electricity Pricing for High Energy-consuming Enterprises	NDRC
2010	Notice on Immediately Organizing a Large-scale Inspection on National Electricity Price	NDRC
2011	Guiding Opinions on the Pilot Implementation of Tiered Pricing for Household Electricity	NDRC

MWREP: Ministry of Water Resources and Electrical Power; NDRC: National Development and Reform Commission; SEC: State Economic Committee; SEO: State Energy Office; SEPA: State Environmental Protection Administration; SERC: State Electricity Regulatory Commission; SETC: State Economic and Trade Commission; SPC: State Planning Committee; SPB: State Pricing Bureau

Table 2 Historical evolutions of policies in coal sector

Year	Energy policies	Responsible agency
1982	Principle of state-owned, collectives and individuals all work together to develop large, medium, and small mines	SC
1983	Report on Eight Measures for Accelerating the Development of Small-scale Coal Mines	MOC
1983	Notice on the Price Increase of Coal Overcapacity in Part of Coal Mines, Trial	SPC, ETC, MOF
1993	Deregulation of coal prices except for coal to electricity	SPC
1994	Program of support, renovation, adjustment and upgrading guideline for Township and Village Coal mines	SC
1994	Management statute for Township and Village Coal mines and the management methods of coal production permit to slow the production of local coal mines	SC
1996	Implementation of National Guidance on the Coal Price Notification	SPC
1998	Notice on the relevant issues of reformation the managerial system of major state-owned coal mines	SC
1998	Notice on issues about closing mines and dwindling the production of coal industry	SC
2002	Cancellation of the guided price except for coal price under “Important Contracts”	SDPC
2005	Opinions on Promoting the Healthy Development of the	SC

	Coal Industry	
2006	Cancellation of coal price under “Important Contracts”	NDRC
2007	Coal Industrial Policy	NDRC
2010	Notice on making good cooperation across coal production, transportation and demand in year 2011	NDRC
2012	Guiding opinions on deepening the reform of thermal coal market	NDRC

ETC: Economic and Trade Commission; MOC: Ministry of Coal; MOF: Ministry of Finance; NDRC: National Development and Reform Commission; SC: State Council; SDPC: State Development and Planning Commission; SPC: State Planning Committee

Table 3 Historical evolutions of policies in oil-gas sector

Year	**Energy policies**	**Responsible agency**
1981	100 Million tones crude oil production contract	MPI
1994	State-controlled pricing system	SPC
1998	Crude Oil and petroleum Products Prices Reform plan	SPC
2001	Government-administered strategic oil reserve program	NDRC
2007	Mandated commercial oil reserve	NDRC
2007	Cancellation of the automatic import license administration of natural gas and LNG	MOC
2002	West–East Gas Pipeline First-line project	CNPC
2008	West–East Gas Pipeline Second-line Project	CNPC
2012	West–East Gas Pipeline Third -line Project	CNPC
1997	Shaanxi-Beijing Gas Pipeline First -line Project	CNPC
2004	Shaanxi-Beijing Gas Pipeline Second-line Project	CNPC
2009	Shaanxi-Beijing Gas Pipeline Third-line Project	CNPC
2002	Xinjiang - Shanghai Gas Pipeline Project	CNPC
2008	Xinjiang - Guangdong Gas Pipeline Project	CNPC
2007	Central Asia- China Gas pipeline	CNPC
2009	China–Myanmar Gas pipeline	CNPC
2012	China -Russia Gas pipeline	CNPC
2002	Guangdong LNG Terminal Project	CNOOC
2005	Fujian LNG Terminal Project	CNOOC
2008	Dalian LNG Terminal Project	CNPC
2004	Qingdao LNG Terminal Project	Sinopec
2008	Jiangsu LNG Terminal Project	CNPC
2012	Shenzhen LNG Terminal Project	CNOOC
2010	Zhuhai LNG Terminal Project	CNOOC
2005	Notice on Reforming the Formation Mechanism of Natural Gas Ex-factory Price and Appropriately Raising Natural Gas Ex-factory Price in the Near Term	NDRC
2007	Natural Gas Utilization Policy	NDRC
2010	Notice regarding Increasing Benchmark Ex-plant Price of Domestically Produced Onshore Natural Gas	NDRC
2011	Notice regarding granting rebates for import value-added taxes on imports of natural gas	MOF, GAC, SAT
2011	Circular of the National Development and Reform	NDRC

	Commission on Initiating Pilot Reforms for Natural Gas Price Formation Mechanisms in Guangdong Province and Guangxi Autonomous Region	
2012	new Natural Gas Utilization Policy	NDRC

CNOOC: China National Offshore Oil Corporation; CNPC: China National Petroleum Corporation; GAC: General Administration of Customs; MOC: Ministry of Coal; MOF: Ministry of Finance; MPI: Ministry of Petroleum Industry; NDRC: National Development and Reform Commission; SAT: State Administration of Taxation; Sinopec: China Petrochemical Corporation; SPC: State Planning Committee

Table 4 Historical evolution of policies on renewable energy

Year	Energy policies	Responsible agency
1994	Regulation about the Management of Grid-Connected Wind Farms	MEP
1996	Brightness Program	SDPC
1996	Ride the Wind Program	SDPC
1998	Crop Stalk Gasification Project for rural area	SDPC
1999	Notice on further supporting Renewable Energy Development	SDPC, MST
1999	National Debt Wind Power Program	SETC
2002	Township Electrification Program	SDPC
2003	Wind Power Concession Project	NDRC
2003	Regulations on Rural Biogas Projects Supported by National Bond	MOA
2003	National Debt Project for Rural Biogas Construction	MOA, NDRC
2006	Medium- and Long-Term Nuclear Power Development Plan (2005-2020)	NDRC
2005	Regulation of the Construction and Management of Wind Farms	NDRC
2006	Regulation on the Administration of Power Generation from Renewable Energy	NDRC
2006	Provisional Management Measures on Renewable Electricity Tariffs and Cost Sharing Program	NDRC
2007	Interim Measures on Revenue Allocation from Renewable Surcharges	NDRC, SERC
2007	Development Scheme for Service System of Rural Biogas in China	MOA
2007	Medium and long-term Plan for Renewable Energy Development	NDRC
2007	Measures on Supervision and Administration of Grid Enterprises in the Purchase of Renewable Energy Power	SERC
2007	China’s rural biogas project planning (2006–2010)	MOA
2007	Guidelines on Adjusting Import Taxes on High-Voltage Wind Turbines and Components	MOF
2008	Circular on VAT and Import Tariff Rebate on Key Wind Turbine Components	MOF
2008	Management Regulations on Special Fund for the Industrialization of Wind Power Manufacturing Sector	MOF

2009	Golden Sun program	MOF, MST, NEA
2009	Circular on the Establishment of Feed-in Tariffs for On-grid Wind Power Projects	NDRC
2010	Interim Measures of Offshore Wind Power Development and Construction	NEB, SOA

MEP: Ministry of Electric Power; MOA: Ministry of Agriculture; MOF: Ministry of Finance; MST: Ministry of Science and Technology; NDRC: National Development and Reform Commission; NEA: National Energy Administration; NEB: National Energy Bureau; SDPC: State Development and Planning Commission; SERC: State Electricity Regulatory Commission; SETC: State Economic and Trade Commission; SOA: State Oceanic Administration

Table 5 Historical evolution of energy conservation policies

Year	Energy policies	Responsible agency
1993	Implementing Rules for the Resource Tax Interim Regulations	MOF
2001	Electric Vehicles research and development (863 Program)	MST
2004	Opinions on Government Procurement of Energy-saving Products	NDRC, MOF
2005	Temporary Regulation on Promoting Industrial Structure Adjustment	SC
2006	Guidelines for Implementation of Ten Key Energy-saving Projects	NDRC
2006	Notification on Promoting Structure Adjustment of Industries with Surplus Energy Production	SC
2006	Guidance to expedite structural adjustment of aluminum, coal, cement, calcium carbide, coke, ferroalloy and textile industries	NDRC
2006	Top-1000 Enterprises Energy-Saving Program	NDRC, NBS, SASAC, ONELG, GAQSIQ
2006	Reduction of export-tax rebate	MOF
2006	Notice on Strengthening Energy Conservation Assessment and Examination for Fixed Assets Investment Projects	NDRC
2007	Opinion on Promoting Service Industries	SC
2007	Reduction of export-tax rebate for steel products	MOF
2007	Notification on the Establishment of compulsory Government Procurement System of Energy-saving Products	SC
2007	Interim Administrative Method for Incentive Funds for Heating and Metering and Energy Efficiency Retrofit for Existing Residential Buildings in Northern Heating Area	MOF
2008	Civil Building Energy Conservation Ordinance	MOHURD, NDRC

2008	Public Institution Energy Conservation Ordinance	MOHURD, NDRC
2008	First Catalogue of National Key Energy-saving Technologies to Promote	NDRC
2009	Second Catalogue of National Key Energy-saving Technologies to Promote	NDRC
2009	Notification of Adjustment of the List of Energy-saving Products in Government Procurement	NDRC, MOF
2009	Program of Benefiting the Public through Energy Efficient Products	NDRC, MOF
2009	Notice on New Energy Vehicle Demonstration and Extension Work	MOF, MST
2010	Notice on Subsidies for Private Purchases of New Energy Vehicles	MOF, MST, MIIT, NDRC
2010	Third Catalogue of National Key Energy-saving Technologies to Promote	NDRC
2011	Fourth Catalogue of National Key Energy-saving Technologies to Prom	NDRC
2011	Revised Implementing Rules for the Resource Tax Interim Regulations	MOF
2012	Fifth Catalogue of National Key Energy-saving Technologies to Prom	NDRC

GAQSIQ: General Administration of Quality Supervision, Inspection and Quarantine; MIIT: Ministry of Industry and Information Technology; MOF: Ministry of Finance; MOHURD: Ministry of Housing and Urban–Rural Development; MST: Ministry of Science and Technology; NBS: National Bureau of Statistics; NDRC: National Development and Reform Commission; ONELG: Office of National Energy Leading Group; SASAC: State-owned Assets Supervision and Administration Commission; SAT: State Administration of Taxation; SC: State Council

Table 6 Historical evolutions of environmental policies

Year	**Environment policies**	**Responsible agency**
1984	Water Pollution Prevention and Control Law	NPC
1988	Interim Measures on Management of Water Pollutant Discharge Permits	NEPA
1989	Environmental Protection Law	SC
1994	China Certification Committee for Environmental Labelling of Products	NEPA, SBTS, SAIEIQ
1996	Integrated Wastewater Discharge Standard	NEPA
1996	Amended Water Pollution Prevention and Control Law	NPC
1996	Plan on Total Emission Control of Major Pollutants during the Ninth Five-Year Period	SDPC, SETC, NEPA.
1996	Decision on Several Issues Concerning Environmental Protection	SC
1997	Recommendation on Promoting Cleaner Production in	NEPA

	China	
1998	Plotting Program of Acid Rain and SO2 Control Zones	SEPA
1998	Notice on Extend Areas for Trial Charges for SO2 in the Acid Rain Control Zones and SO2 Pollution Control Zones	SEPA
2002	Cleaner Production Promotion Law	NPC
2006	Interim Measures on Public Participation in Environmental Impact Assessment	SEPA
2007	Pilot Program on the Franchise of Desulfurization of Particulates and Gas at Thermal Power Plants	NDRC, SEPA
2007	Document on Desulfurization Wholesale Price, Desulfurization Facilities Operation, and Management Methods for Thermal Power Units	NDRC
2007	Regulations on Governmental Information Disclosure	SC
2007	Trial Guidelines for Environmental Information Disclosure	MEP
2008	Amended Water Pollution Prevention and Control Law	NPC
2009	Measures for management of Voluntary Emission Reductions Transactions in China	NDRC
2009	Levy a carbon tax in China in 2012-2013	MOF
2011	Guidelines for compilation of provincial GHG inventories	NDRC
2011	Notice on Carrying out the Work of Pilot Carbon Emission Trading	NDRC

MEP: Ministry of Environmental Protection; MOF: Ministry of Finance; NDRC: National Development and Reform Commission; NEPA: National Environmental Protection Agency; NPC: National People's Congress; SAIEIQ: State Administration of Import and Export Inspection and Quarantine; SBTS: State Bureau of Technical Supervision; SC: State Council; SDPC: State Development and Planning Commission; SEPA: State Environmental Protection Administration; SETC: State Economic and Trade Commission

Table 7 Historical evolutions of health policies

Year	**Environment policies**	**Responsible agency**
1997	Decision on health reform and development	SC
1998	Decision on Establishing the Urban Employees' Basic Medical Insurance System	SC
2001	Guideline on Rural Health Sector Reform and Development	SC
2002	Decisions on Strengthening Rural Healthcare	SC
2006	Guiding Opinions on Developing Community Health Service in Cities	SC
2007	Guiding Opinions on the Pilot Urban Resident Basic Medical Insurance	SC
2007	National Action Plan for Environment and Health (2007–2015)	MOH, SEPA and other 16 ministries
2009	Opinions on Deepening the Reform of the Medical and Health Care System	SC

2009	National List of Essential Drugs	MOH
2009	Provisional Regulation on Administration of National List of Essential Drugs	MOH
2009	Implementing Opinion on Establishment of Essential Drug System	MOH
2010	Guidelines on Pilot Public Hospital Reforms	MOH
2011	Work Plan on Pilot Public Hospital Reforms	SC
2012	Notice on Pilot County-level Public Hospital Reforms	SC
2012	New National List of Essential Drugs	MOH

MOH: Ministry of Health; SC: State Council; SEPA: State Environmental Protection Administration